

Dr. Airy's Report to the Local Government Board on Diphtheria in the Battle Registration District.

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IN consequence of the frequent occurrence in the Battle district of deaths from diphtheria, as shown by the quarterly returns made to the Registrar General and the Reports of the Medical Officers of Health, the Local Government Board directed inquiry to be made, by one of their Medical Inspectors, into the circumstances attending this local prevalence of diphtheria. The inquiry was made on the 27th and 28th of March 1878.

The Battle Registration District lies in the eastern part of Sussex, and extends from the river Rother, on the border of Kent, in the north, to the sea between Hastings and Eastbourne in the south. Geologically, the district lies on the Wealden formation, consisting of sands and sandstone rock alternating with beds of clay. A gypsum mine is worked near Battle, the vein having been discovered in sinking the "Sub-Wealden exploration" bore-hole through the Sub-Wealden strata in search of coal. In the northern part of the district there are hills rising to a height of 600 or 700 feet, extensively clothed with woods, partly the remains of the ancient primitive forest and partly planted for hop-poles. The sheltered vales and hollows among the hills are cultivated especially for hops. The people are mostly agricultural. The inducement, which formerly prevailed, to vary agriculture with smuggling, no longer exists. In September and October the district is visited by crowds of "hoppers" from London, who are housed by the farmers in huts specially provided for them.

The South-Eastern group or division of counties (as grouped by the Registrar General for purposes of registration) to which Sussex belongs stands conspicuous, though rivalled by the Welsh and West Midland groups, for prevalence of fatal diphtheria in the period of eight years 1870-77.

AVERAGE ANNUAL DEATH-RATE from DIPHTHERIA, per 10,000 LIVING in the DIFFERENT DIVISIONS of ENGLAND and WALES.

South-Eastern Division	-	-	-	1.38
Welsh	-	-	-	1.37
West Midland	-	-	-	1.34
North-Western	-	-	-	1.18
Northern	-	-	-	1.06
London	-	-	-	1.02
North Midland	-	-	-	1.01
Eastern	-	-	-	0.99
York	-	-	-	0.93
South Midland	-	-	-	0.88
South-Western	-	-	-	0.88
England and Wales	-	-	-	1.11

Of the five counties comprised in the South-Eastern Division, Sussex has the highest death-rate from diphtheria,—

Sussex	-	-	-	-	1.93
Kent	-	-	-	-	1.43
Surrey	-	-	-	-	1.28
Hampshire	-	-	-	-	1.16
Berkshire	-	-	-	-	0.95

and of the 20 Sussex Unions the Battle Union has the highest death-rate from that disease,—

Battle	-	-	4.98	Steyning	-	-	2.18	Brighton	-	-	1.25
Petworth	-	-	4.67	Hastings	-	-	2.11	Uckfield	-	-	1.19
Ticehurst	-	-	3.83	East Grinstead	-	-	1.99	Midhurst	-	-	1.04
East Preston	-	-	3.08	West Hampnett	-	-	1.75	Lewes	-	-	0.89
Chichester	-	-	2.79	Cuckfield	-	-	1.66	Westbourne	-	-	0.51
Horsham	-	-	2.66	Eastbourne	-	-	1.53	Thakeham	-	-	0.44
Hailsham	-	-	2.28	Rye	-	-	1.45				

In comparing the returns from different districts relating to diphtheria, a disease which may sometimes appear in the death registers under other names, and in which the absolute numbers to be dealt with are not large, we cannot confidently regard small differences in the death-rates as certain proof of corresponding differences in the local conditions. But where the returns from a district of considerable size like the Battle Union show a death-rate exceeding the average for the country at large almost in the proportion of five to one, it can hardly be doubted that we have in that district a combination of local conditions highly favourable to the origin or spread of the disease in question.

The death-rate from diphtheria in the Battle Union appears all the more excessive in connexion with the comparatively low death-rates in the same district from all causes and from other diseases of the zymotic class. In the eight years 1870-77 the death-rate from all causes has been 15·3 per 1,000 living. Against a total of 56 deaths from diphtheria, there has been only one death from small pox, and only three from measles, 26 from scarlet fever, 10 from whooping cough, 40 from 'fever' (*i.e.*, enteric fever), and 32 from diarrhoea.

Throughout England and Wales, in the same period, for every death from diphtheria there have been nearly three from small pox, more than three from measles, more than seven from scarlet fever, more than four from whooping cough, more than five from 'fever,' and more than eight from diarrhoea.

Within the Battle district, the three separate sub-districts of Bexhill, Ewhurst, and Battle have suffered from diphtheria in very different degrees during the eight years under consideration. For the Bexhill sub-district, the average annual diphtheria death-rate has been 4·45 per 10,000 living; for the Battle sub-district, 3·45; and for the Ewhurst sub-district, 9·33. It thus appears that the Ewhurst sub-district has been distinguished beyond the rest of the Union by prevalence of fatal diphtheria. At the same time it has suffered less from the other six principal diseases of the zymotic class in the proportion of 7·5 per 10,000 living in the Ewhurst sub-district to 9·9 and 11·1 respectively in the Battle and Bexhill sub-districts. The Ewhurst sub-district occupies the north-eastern part of the Union, and is more hilly and more thickly wooded than the Bexhill sub-district, but does not appear to differ much in physical character from the Battle sub-district. It should be observed, however, that the mortality returns for the Battle sub-district take their character chiefly from the town of Battle, while the Ewhurst sub-district contains only a village population.

Diphtheria  
in the  
Bexhill and  
Battle  
subdistricts.

In the Bexhill sub-district, in the latter half of 1877, there were two isolated outbreaks of diphtheria at two solitary points far apart in the parishes of Bexhill and Catfield. In neither case was there any traceable connexion with any known source of infection. In both instances there were filthy surroundings, foul privy ditches or offensive cesspools. At one place the water was found impure, at the other it was found free from impurity, on analysis.

There were also two deaths from diphtheria in the town of Battle in the fourth quarter of 1877.

With these exceptions, the Battle and Bexhill sub-districts do not call for notice in respect of recent diphtheria. It is with the Ewhurst sub-district that this inquiry is especially concerned.

Diphtheria  
in the  
Ewhurst  
subdistrict.

Looking back through the old registers of deaths in the Ewhurst sub-district, the first entry of a death from "diphtheria" is met with in December 1858. In the 21 years preceding there had been 20 deaths from "croup"; in the 19 years succeeding there were only six deaths from "croup," while there were 41 from "diphtheria," including two from "ulcerated throat."

In 1858-9 diphtheria caused three deaths in the parish of Ewhurst; in 1860, three deaths in the parish of Mountfield; in January 1861, three deaths in Ewhurst: in 1862 there were two deaths from "ulcerated throat" in Sedlescomb parish. During the next ten years the deaths from throat disease were remarkably few. In the first half of 1873 there were two deaths from "croup" in Sedlescomb parish, one in January and one in April; and in the autumn of that year there was a very severe outbreak of diphtheria in Sedlescomb, causing four deaths in September and November. The disease broke out afresh in the same parish in the following spring (1874), and caused four deaths in the course of six months. Thus, in little more than twelve months there were eight deaths from diphtheria in this country parish, which in 1871 had only 639 inhabitants. In June 1875, two deaths from diphtheria were registered in the parish of Ewhurst, and three in the following year, 1876, besides one in Sedlescomb. Another death was registered from diphtheria in Sedlescomb in August 1877.



In November 1877 an outbreak began in Ewhurst parish, and continued into January of the present year, 1878, causing in all seven deaths out of 23 persons attacked, in eight families. This outbreak appears to have been limited to a hamlet called Staple Cross, and the immediate vicinity. The situation of the hamlet is remarkably exposed, on the top of a clayey hill, from which the ground falls in all directions except eastward. The first case occurred in the family of a widow named Jarman, living in a small cottage at the east end of the hamlet. There were three children in the house, aged 10, 7, and 4 years. The first two escaped attack. The child of four years, a boy, sickened on the 4th of November, and died on the 7th. It is not known that he had been near any place or person that could be suspected of diphtheritic infection; but it must be remembered that there had been a great deal of diphtheria in Sedlescomb and Ewhurst during the previous four years, and it is at least possible that the disease may have been directly transmitted from one of those earlier cases. The boy had certainly not been far from home, for he was attending school (a Wesleyan school in Staple Cross), up to the day when he was taken ill. The cottage where this case occurred is not conspicuous for sanitary defects; it has an ordinary privy with cesspit some distance in rear. Previous to the outbreak of diphtheria there had been a very foul ditch in front of the cottage; but at the time of the outbreak this had been in great part replaced by a covered drain, which at the time of my visit was discharging into an open cesspool in a strip of copse only four or five yards from the public road. The Jarmans obtained drinking-water from a roadside spring. This water was analysed by Dr. Fussell, Medical Officer of Health for the combined East Sussex districts, and was found to be largely contaminated. In this respect it probably differs little from the bulk of the potable waters of the district.

The next case occurred in a comfortable cottage near a brook, in a sheltered dingle more than a mile distant from Staple Cross, in a family named Mephams. The date of attack was about the 6th of November, only two days later than the case of the boy Jarman. The Mephams had six children, aged 11, 9, 6, 5, 2, and the sixth an infant in arms. A girl of 11 years was the first attacked of the family; she had been attending the same school as Jarman. Subsequently all the other children were attacked, and two (aged 5 and 2) died. This cottage has an ordinary privy, with bricked cesspit in the garden. Water is drawn from a covered spring well, not manifestly exposed to pollution.

A girl of 12, named Sellman, living at a cottage on a hill above the Mephams, who had not been attending school, but had visited the Mephams when their little girl was ill, was attacked with diphtheria on November 14. She recovered. Two other children in the same family, aged 9 and 8, both attending school, were afterwards attacked, and recovered. The youngest child, aged 3, was also attacked, and died. The eldest of the family, aged 17, escaped altogether. The Sellmans' cottage is the middle one of a row of three. In one of the adjoining houses there was a family of four children, aged 14, 12, 8, and 6, who were in frequent intercourse with the Sellmans, but entirely escaped diphtheria; and in the other house there was a girl of 15, who also used to visit the Mephams, but was not affected beyond feeling poorly. The privy to these houses has a very foul cesspit. Water is drawn from a well ten yards distant from the privy.

On the 16th of November a girl of 10 years, named Osborne, living in quite another part of the parish, but attending the Staple Cross school, was attacked, and subsequently five other children of the same family, aged 12, 6, 4, 2, and 1. All recovered. There appeared to be nothing in the condition of the dwelling likely to cause disease.

A girl of 7, one of five children, in a family named Milham, living in a very confined and ill-ventilated cottage just within the border of Sedlescomb parish, but attending the Staple Cross school, was taken ill about the 6th of December and died on the 13th. All the other children (aged 6, 5, 3, and 1) sickened afterwards, and the one aged 3 died on December 28th. This cottage is one of a pair. In the adjoining cottage there were three children, aged 5, 3, and the third an infant in arms, who were frequently in the Milhams' cottage but did not take the disease.

Cases of diphtheria appeared in three other families in December, in and around Staple Cross. In each case the child first affected was attending the Staple Cross school.

A table of the cases here mentioned is given below.

The Wesleyan school in Staple Cross, which was attended by the first child attacked in every one of the families, except the Sellmans, that suffered from diphtheria in this outbreak, stands by the side of the high road on the northern slope of the Staple Cross

School at  
Staple  
Cross.



hill, at a lower level than the chief cluster of houses in the hamlet. The schoolrooms are large and lofty and well lighted and ventilated. The closets are ordinary privies with cesspools; the boys' closets stand on higher ground, and the overflow from their cesspool enters the cesspool of the girls' closets. From the latter the overflow escapes along a ditch between a meadow and a wood. There is a pump on the premises yielding better water than the children could get at most of their homes. Complaint has frequently been made of a nuisance of long standing, which has never been entirely abated, arising from an open drain by the road side, which begins at a brewery near the hilltop on the same side as the school, is then carried under the road to the other side, and running down opposite the school is allowed to spend itself in its own ditch by gradual deposit, filtration, and evaporation. The schoolmaster describes the effluvia from this ditch as intolerably offensive. The brewery has lately been disposed of, and the nuisance is in abeyance for awhile.

This school is the only one in the neighbourhood, and therefore we have not the means of estimating, by comparison with other schools, the extent to which the spread of diphtheria was promoted by congregation in the class-room; but the fact that in every fresh family attacked (with one exception otherwise accounted for) the first person to suffer was a child attending the school, appears strongly indicative of infection communicated at the school. The school was not closed during the prevalence of diphtheria. Under the advice, however, of the Medical Officer of Health, children living in or near houses known to be infected were kept away from school; and this precaution was adopted so extensively, that, as appears from the school register, out of 144 registered attendants as many as 80 were absent in December. Yet the Medical Officer of Health, in a report on this outbreak, dated 13th December 1877, states "At one of our visits to the public school we found a 'teacher' present from an infected dwelling, and unknown to the master, some children had been attending there from a similar focus of the disease."

Sanitary defects.

The chief defects from a sanitary point of view in the Battle Union are the want of pure water, the want of proper method of excrement disposal, and in parts the want of drainage.

(1) Water.

For drinking-water the villagers depend on (1) wells sunk near their dwellings and for the most part in danger of pollution from neighbouring privies, or pigstyes, or refuse heaps; (2) natural springs, in some cases free from suspicion, but usually not properly protected; (3) surface pools and roadside ditches, full of vegetable matter and exposed to various kinds of impurities.

Dr. Fussell has analysed many samples of these waters, and finds them largely polluted.

(2) Excrement disposal.

The privies generally have cesspools sunk several feet below the surface of the ground, loosely bricked at the sides, but not at the bottom. Where the soil is clayey, as it is in many parts of the district, these cesspools retain whatever fluid they receive, and not unfrequently they become gathering-pools for the surface wet of the soil around. In this condition they can never be properly emptied and cleaned out: no sooner is the fluid removed than it gathers again: they can only be described as nuisances always likely to recur. Under the advice of the Medical Officer of Health and the superintendence of the Inspector of Nuisances several pail-closets have been erected at Staple Cross since the diphtheria outbreak. There has not yet been time to test fully the operation of this system. If (as I understood to be the case) the emptying of the pails is left to the cottagers themselves, there will probably be neglect in some cases, or nuisance will be likely to arise from temporary storage of the manure, at times when it is not wanted on the garden. The pail system can hardly be trusted to work well unless the emptying is done regularly by servants of the Sanitary Authority, or by some one who will contract with the Authority to do the work. A very convenient arrangement, which is practised in some other rural districts, is for the Authority to contract separately for the scavenging work in each separate village with a farmer living in the immediate neighbourhood of that village.

(3) Drainage.

In many of the smaller villages and hamlets in the rural district, nuisance arises from want of proper slop drainage. In the larger villages, *e.g.* Bexhill, Hollington, and Sedlescomb, there are drainage works either complete or in progress. The Bexhill drainage is carried into a natural watercourse; that at Hollington is to be disposed of in the way of irrigation.

In concluding this Report, I have pleasure in acknowledging the attention and assistance which I received from all the officers of the Rural Sanitary Authority with whom I had communication.

HUBERT AIRY.

Recommendations.

1. The Rural Sanitary Authority should seek to give effect to the powers which they possess, under sections 40 and 41, or 95 and 96, of the Public Health Act, 1875, for procuring such action on the part of the owners of property, as will prevent the recurrence of cesspool nuisances. The principle that should rule in these matters is that human excrement and organic refuse of all kinds ought to be removed as soon as possible from the vicinity of human dwellings, and during the short time that it must unavoidably remain in the place of temporary deposit, it should be kept as dry as possible. Information as to the various means in use for gaining these ends will be found in the Official Report, "On certain means of preventing Excrement Nuisances in Towns and Villages."

2. The Rural Sanitary Authority should take steps to provide against the recurrence of nuisance from the brewery ditch near the Staple Cross School.

3. It is advisable that some more wholesome arrangement than that at present in use should be adopted for the children's closets at the Staple Cross School.

LIST of FAMILIES attacked by DIPHTHERIA in the EWHURST SUB-DISTRICT in November and December 1877 and January 1878.

Name.	Number and ages of children in family.		Number and ages of children attacked. *Fatal cases.		Age of child first attacked.	Date of first attack.	Child first attacked attending Staple Cross School.
1. Jarman -	3	10, 7, 4	1	4*	4	Nov. 4	Yes.
2. Mephram	6	11, 9, 6, 5, 2, ½	5	11, 9, 6, 5, * 2*	11	Nov. 6	Yes.
3. Sellman	4	12, 9, 7, 3	4	12, 9, 7, 3*	12	Nov. 14	{ No, but visited No. 2.
4. Osborne	6	12, 10, 6, 4, 2, 1	6	12, 10, 6, 4, 2, 1	10	Nov. 16	
5. Milham	5	7, 6, 5, 3, 1	4	7,* 6, 5, 3*	7	Dec. 6	Yes.
6. Stace -	1	6	1	6*	6	Dec. 11	Yes.
7. Funnell	3	16, 11, 7	1	11	11	Dec. 14	Yes.
8. Crouch -	6	12, 10, 9, 6, 4, 2	1	6	6	Dec. 14	Yes.

